



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/890,378	01/10/2002	Frank W. Harris	UA 335	1584

7590 06/15/2005

Ray L Weber
Renner Kenner Greive Bobak Taylor & Weber
Fourth Floor First National Tower
Akron, OH 44308-1456

EXAMINER

BISSETT, MELANIE D

ART UNIT	PAPER NUMBER
----------	--------------

1711

DATE MAILED: 06/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/890,378

Applicant(s)

HARRIS ET AL.

Examiner

Melanie D. Bissett

Art Unit

1711

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,9-19 and 21-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-5,9-19,21 and 22 is/are allowed.
- 6) ☒ Claim(s) 23-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

1. The rejection based on 35 USC 103 has been altered to reflect the amended subject matter. Also, a new matter rejection for the amendment has been made.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 23-25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claims now limit the method to a step of drying the polyimide layer without further curing the polyimide. The applicants state that support for this limitation is given in the examples, which show heating the samples to temperatures of 180 °C for 48 hours but do not mention curing in this step. However, it is the examiner's position that this heating step suggests curing. Note that the temperature is close to those employed by the prior art to cure polyimide films. Also, the current specification specifically teaches heating the samples to dry and cure the films simultaneously (see p. 14 lines 5-10). It is not clear from the specification that the applicants intend to dry the films without curing.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hougham et al. in view of Gardner et al.

7. From a prior Office action:

Hougham discloses low dielectric constant polyimides for use on electrical devices such as capacitors, semiconductors, and integrated circuits (abstract; col. 1 lines 26-35). One noted combination of monomers matches the applicant's formulas (I or IV) and III to form a polyimide of 6FDA-PFMB (col. 11 lines 38-58; Table 2). Such a polymer has a dry dielectric constant of 2.71 (Table 3). Because the term *about 2.7* encompasses values slightly over 2.7 and allowing experimental error, it is the examiner's position that the cited dielectric constant meets the applicant's limitation of *less than about 2.7*.

Further, Hougham teaches dissolving polyamic acids in solvents, including DMAc and NMP, casting and drying a film, heating the film to initiate ring closure and formation of the polyimide, redissolving the film, and cycling the process until a desired molecular weight is achieved (Figure 4; col. 4 lines 13-42). Also, the formation of integrated circuits is mentioned. However, the reference does not specifically indicate casting a dissolved polyimide onto a substrate to form an integrated circuit. Gardner teaches methods for forming an integrated circuit, where the low dielectric materials are deposited or spin-coated onto the substrate (col. 5 lines 44-67).

8. Regarding the limitation that the films are dried without further curing the polyimides, it is noted that the Hougham reference teaches applying the solutions to a substrate, heating to increase the molecular weight of the polyimides, and redissolving the material. It should be noted that the "curing" in the reference refers to further increasing molecular weight by imidization reactions and chain extension and not to

crosslinking between polymer chain backbones. The solutions are applied to quartz substrates (col. 6), which provide an inert substrate for the intermediate material. It would have been prima facie obvious to perform the method of Hougham's invention to obtain the desired molecular weight and harvested the polyimide for shipping purposes. The reference teaches that applications for the polyimide include integrated circuits. Once the high molecular weight polyimide is redissolved for casting onto the final integrated circuit substrate, heating would not serve to further cure the material (since it would be at the desired molecular weight) but would only evaporate the casting solvent. This process would allow for the polyimide to be shipped in its final form and cast on conventional machinery at another location. The Gardner reference teaches the use of readily available materials for casting onto integrated circuits and thus supports this procedure.

Allowable Subject Matter

9. Claims 1-5, 9-19, and 21-22 are allowed.
10. The closest prior art, Hougham et al. (US 5,324,813 A), discloses low dielectric constant polyimides for use on electrical devices such as capacitors, semiconductors, and integrated circuits. The polyimide materials fit the applicant's formulas (I or IV) and III. However, the reference teaches a dielectric constant for this polymer of 2.71. The reference does not teach forming the polymer to have a dielectric constant of less than about 2.5 or teach the applicant's claimed thermal expansion coefficients. It is therefore the examiner's position that the applicant's claimed dielectric constant of less than

about 2.5 and the applicant's claimed thermal expansion coefficients provide a novel and unobvious step over the prior art integrated circuits.

Response to Arguments

11. In response to the applicant's arguments that the presently claimed invention does not cure the polyimide but that it would destroy the primary reference to remove the curing step of the invention, it is noted that this seems contradictory to the applicant's original claims. The curing step of the primary reference serves to increase the molecular weight of the polyimide/polyamic acid coating by imidizing any remaining polyamic acid. As the process is recycled, less and less imidization occurs. As the claims stand, it is the examiner's position that the methods of claims 23-25 would be obvious over the cited prior art.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

Art Unit: 1711

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melanie D. Bissett whose telephone number is (571) 272-1068. The examiner can normally be reached on M-F 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571) 272-1078. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Melanie D. Bissett
Patent Examiner
Art Unit 1711

mdb